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NCK days 2017

15 – 17 March



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Royal Netherlands Naval College (KIM) – Den Helder

DOI number: 10.18174/410129

This report is free to download: <https://doi.org/10.18174/410129>

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Analysis of spatial variations in sand wave shapes

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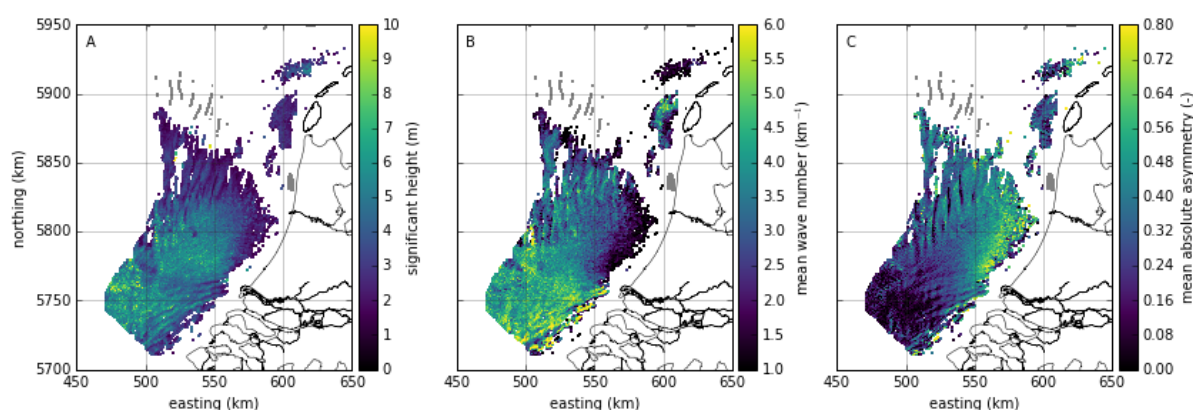
Introduction

Sand waves are rhythmic bed forms with lengths between 100 and 1000 metres (Ashley, 1990) with varying shapes depending on environmental properties, such as water depth, grain size, tidal characteristics and surface waves. The relation between these environmental properties and sand wave shape characteristics has mainly been investigated using models or case studies of local observations, but no large-scale analysis of these features is available. In this study, all sand waves on the Netherlands Continental Shelf are analysed to determine length, height and asymmetry. This dataset is compared to the impact of tidal flow, surface waves and sediment transport approximations. The aim of this study is to better understand the processes that control sand wave shape characteristics over a large area.

Methods and results

Sand wave properties are extracted by locating crests and troughs of the sand waves per transect. The impact of tides and surface waves is described using Shields parameters for the tidal flow and wave orbital motion at the bed. Rouse numbers are used to describe the dominant mode of transport due to waves and tides and the bed load transport is calculated. The sand wave properties are compared to these process descriptors by selecting locations where only one descriptor varies and all other descriptors are more or less constant (Van Santen, 2011).

The results show both small- and large-scale spatial variations in sand wave shapes on the NCS with generally steeper sand waves to the south and more asymmetrical sand waves to the northeast. Of the process descriptors, the mode of transport seems the dominant factor in the spatial variation in sand wave shapes.



Sand wave shapes on the Netherlands Continental Shelf with (A) height, (B) wavenumber and (C) asymmetry

Acknowledgements

The Dutch ministry of public works and Netherlands Hydrographic Office provided the multibeam data in time series and the data was interpolated by Deltares. This research is supported by the Netherlands Organisation for Scientific Research (NWO), which is partly funded by the Ministry of Economic Affairs.

Ashley, G. M. (1990). Classification of large-scale subaqueous bedforms: A new look at an old problem. *Journal of Sedimentary Research*, 60(1).

Van Santen, R. B., De Swart, H. E. & Van Dijk, T. A. G. P. (2011). Sensitivity of tidal sand wavelength to environmental parameters: A combined data analysis and modelling approach *Continental Shelf Research*, 31, 966-978.